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Abstract

Using predictive analytics, we developed a market basket analysis model that will predict future purchases given historical purchasing patterns. Overall, this will help consumers become more aware of products available and contribute directly to the vendor's performance. Our study provides a quantitative and associative design to this problem, where we show the business benefits of using the model to provide intelligent recommendations.

Introduction

In order to predict what products a customer will purchase together in the future, we developed a market basket analysis model given their historical purchasing patterns. For traditional in-store shopping retailers such as Kroger and Meijer, this research is important for developing intelligent product recommendations that predict a consumer's possible buying behaviors. This model will greatly benefit consumers and will increase retailer performance.



Picture source: <http://www.salemmarafi.com/code/market-basket-analysis-with-r/>

Research questions:

1. Based on purchases history, what products will a customer likely purchase together in the future?
2. How does the usage of this recommendation system affect both the consumer and the retailer?

Literature Review

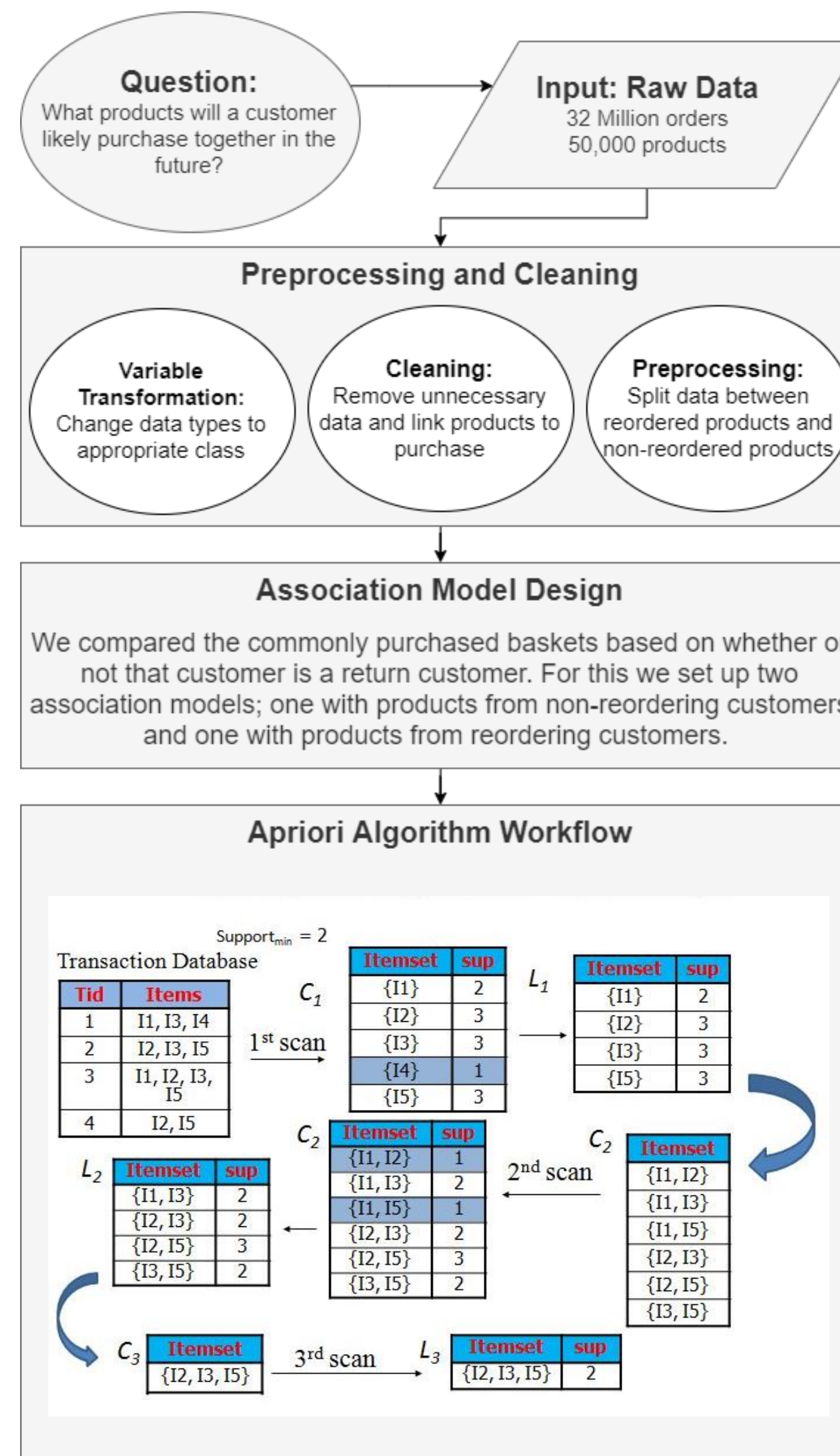
In recent studies, a Market Basket Analysis finds a common association between different items that are purchased while further analyzing their data using the Apriori Algorithm. Generally, supermarket data consists of products that are typically purchased, but does not include items that were repurchased.

Study	Association Rules	Apriori Algorithm	Supermarket	Reordering
(Ting, 2010)	✓			
(Abubakar, 2015)	✓	✓	✓	
(Abdul salam, 2014)	✓	✓	✓	
(Musungwini, 2014)	✓	✓	✓	
Our Study	✓	✓	✓	✓

Table 1: Literature Review Summary

Our study is novel because we are using similar methods, but incorporate the reordering factor to better analyze the associations.

Methodology



Result

This gives us 2 lists of product combinations that are commonly purchased with each other.

Non-Reordered Products		Reordered Products	
1	Bananas / Avacados	1	Organic Bananas / Org. Carrot
2	Strawberries / Kale	2	Cucumber / Org. Avacado
3	Org. Strawberries / cilantro	3	Organic Strawberries / Limes

Business Conclusion

Source: https://www.researchgate.net/figure/Flow-chart-of-AprioriAlgorithm_fig1_265051526

Results

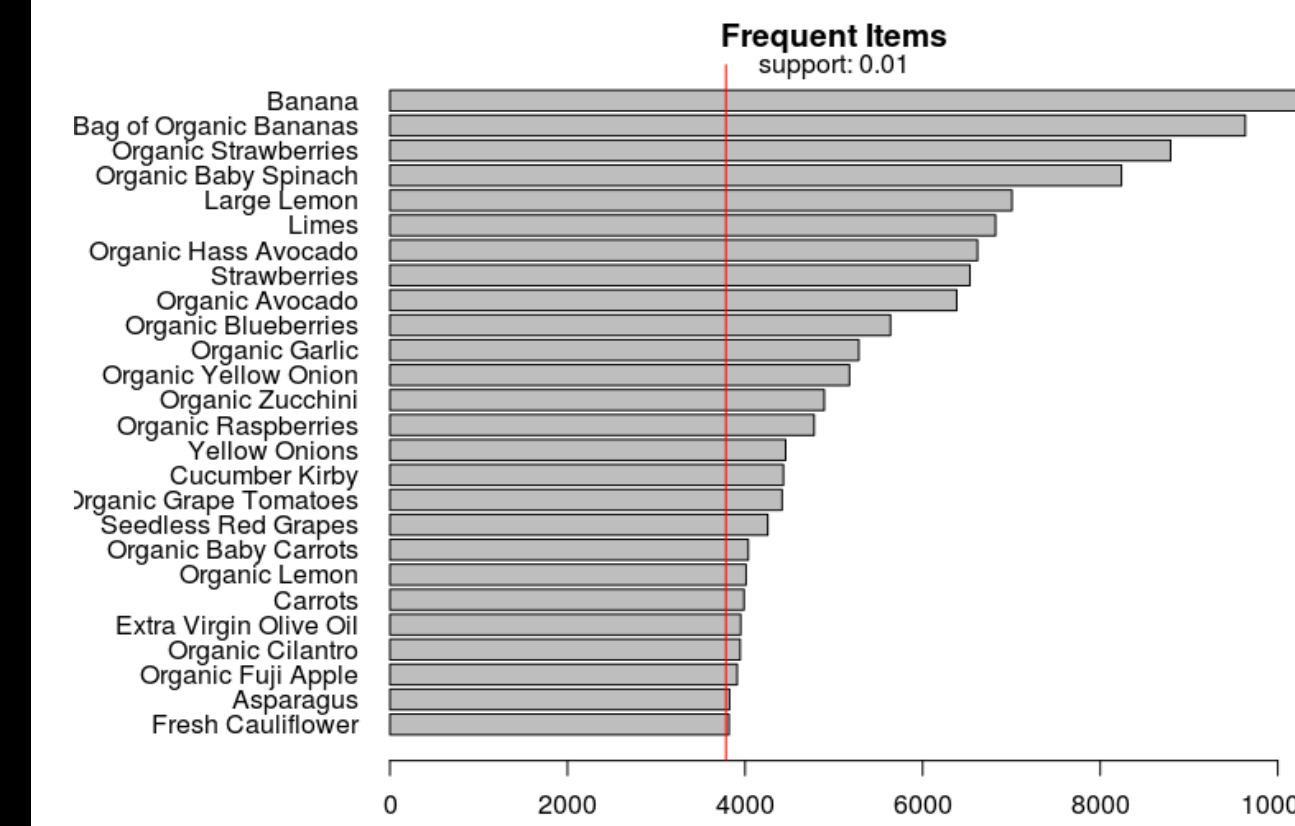


Figure 5: Single Items Purchased- Frequency

This chart shows the frequency of single items purchased by new customers.

We found that Bananas were the most frequent item purchased.

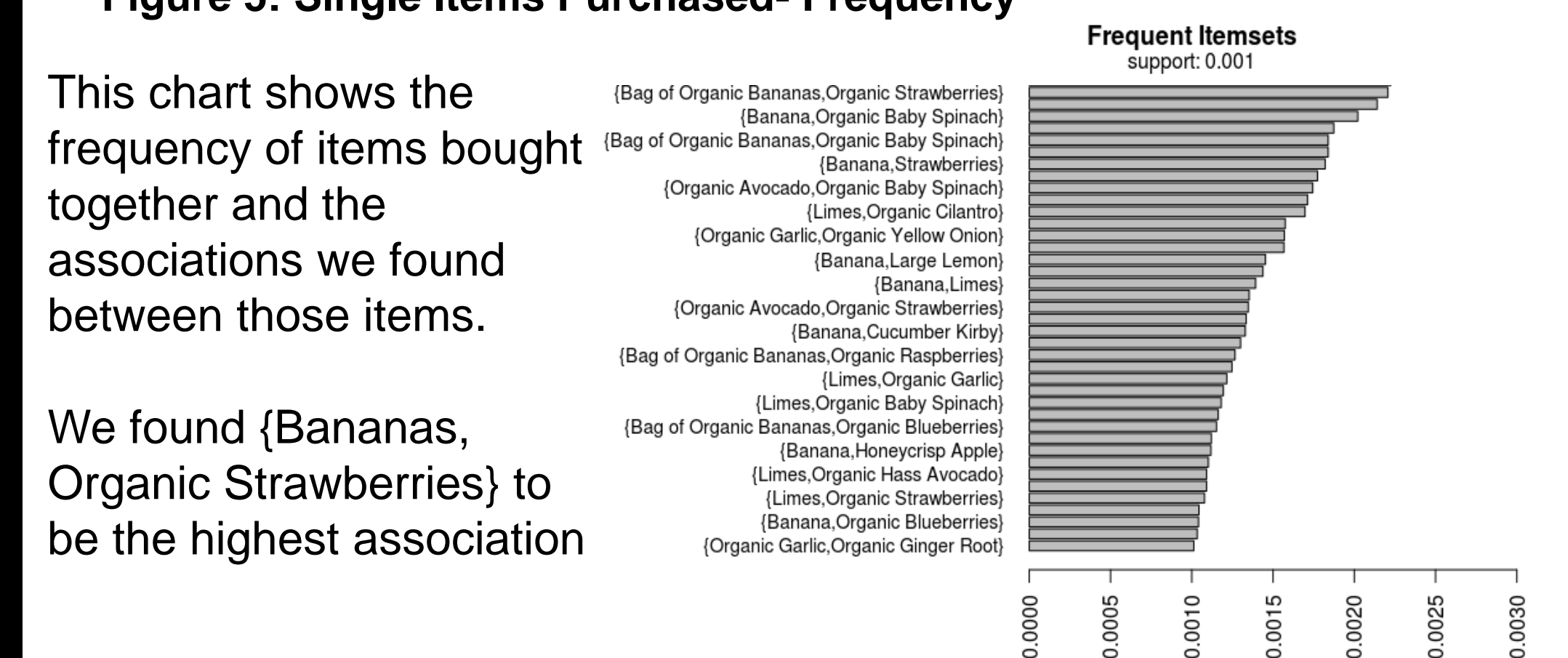


Figure 6: Associations Found- Frequency

This chart shows the frequency of items bought together and the associations we found between those items.

We found {Bananas, Organic Strawberries} to be the highest association

Scatter plot for 173971 rules

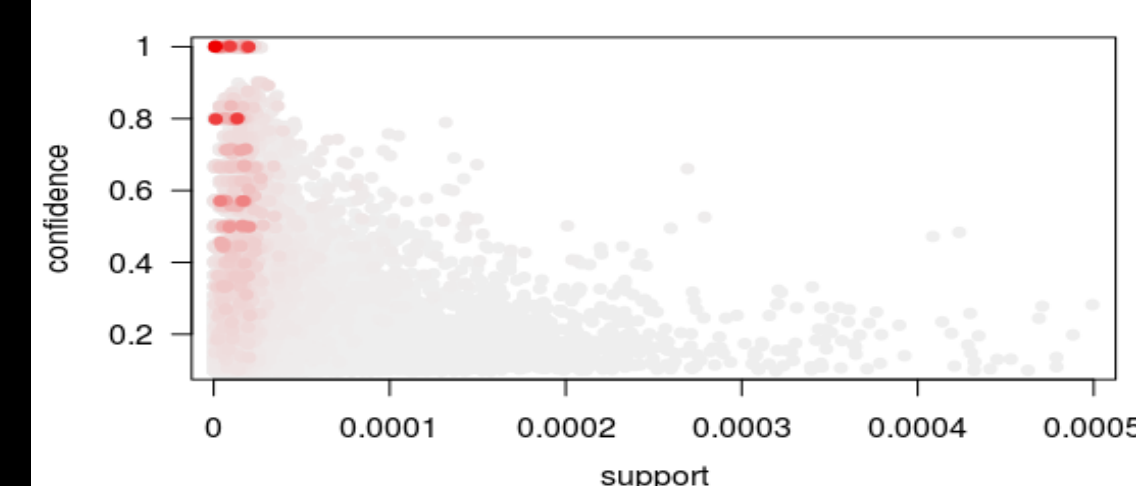


Figure 7: Lift Chart

This Lift Chart shows that there are some rules with a heavy lift indicating a strong association between the items.

Conclusions

This problem is important because companies are relying more on data centered analysis of what their customers will buy now and in the future.

1. Based on purchase history, we found that people tend to purchase fresh fruit, especially when they are returning customers.
2. This model helps customers increase efficiency while shopping and helps retailers better place their items and promotions and potentially increase store sales and revenues.

Acknowledgements

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